

PATENT COOPERATION TREATY

RECEIVED

PCT/GB00/02776

JUN 04 2001

16 21

09/622810

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

TECH CENTER 1600/2000

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year)
26 April 2001 (26.04.01)

International application No.
PCT/GB00/02776

Applicant's or agent's file reference
XA1127

International filing date (day/month/year)
19 July 2000 (19.07.00)

Priority date (day/month/year)
04 August 1999 (04.08.99)

RECEIVED

JUN 06 2001

Applicant

Technology Center 2600

TILSLEY, Gwilym, John

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
26 February 2001 (26.02.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

S. Mafla

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

300

2

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty ☐

For receiving Office use only

International Application No ☐

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) XA1127

Box No ☐ TITLE OF INVENTION

IMPROVEMENTS IN AND RELATING TO SURVEILLANCE SYSTEMS

Box No ☐ APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation) ☐ The address must include postal code and name of country ☐ The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below ☐

MATRA BAE Dynamics (UK) Limited
Six Hills Way
Stevenage
Hertfordshire
SG1 2DA
United Kingdom

☐ This person is also inventor ☐Telephone No ☐

01252 384628

Facsimile No ☐

01252 383091

Teleprinter No ☐

State (that is, country) of nationality:

GB

State (that is, country) of residence:

GB

This person is applicant
for the purposes of:

☐ all designated States☒ all designated States except the United States of America☐ the United States of America only☐ the States indicated in the Supplemental BoxBox No ☐ FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation) ☐ The address must include postal code and name of country ☐ The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below ☐

TILSLEY, Gwilym, John
MATRA BAE Dynamics (UK) Limited
Six Hills Way
Stevenage
Hertfordshire
SG1 2DA
United Kingdom

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below ☐

State (that is, country) of nationality:

GB

State (that is, country) of residence:

GB

This person is applicant
for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box☐ Further applicants and/or (further) inventors are indicated on a continuation sheet ☐Box No ☐ AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation) ☐ The address must include postal code and name of country ☐

BAE SYSTEMS plc
Group IP Department
Lancaster House, P.O. Box 87
Farnborough Aerospace Centre
Farnborough, Hampshire, GU14 6YU
United Kingdom

Telephone No ☐

01252 383145

Facsimile No ☐

01252 383091

Teleprinter No ☐

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent ☐

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

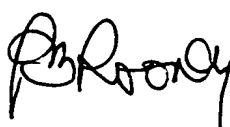
National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LC Saint Lucia |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda | <input checked="" type="checkbox"/> LK Sri Lanka |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MA Morocco |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BZ Belize | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> MZ Mozambique |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CR Costa Rica | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> DZ Algeria | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZA South Africa |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |

Check-box reserved for designating States which have become party to the PCT after issuance of this sheet:



Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claim indicated in the Supplemental Box		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 04 AUGUST 1999	9918248.7	GB		
item (2)				
item (3)				
<input checked="" type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): (1)				
<i>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 40(b)(ii))</i> <input type="checkbox"/> See Supplemental Box				
Box No. VII INTERNATIONAL SEARCHING AUTHORITY				
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):		
ISA / EP		Date (day/month/year)	Number	Country (or regional Office)
		20 JANUARY 2000	99306142.3	EP
Box No. VIII CHECK LIST; LANGUAGE OF FILING				
This international application contains the following number of sheets: request : 03 description (excluding sequence listing part) : 09 claims : 01 abstract : 01 drawings : 02 sequence listing part of description : - Total number of sheets : 16		This international application is accompanied by the item(s) marked below: 1 <input checked="" type="checkbox"/> fee calculation sheet 2 <input type="checkbox"/> separate signed power of attorney 3 <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any: 4 <input type="checkbox"/> statement explaining lack of signature 5 <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6 <input type="checkbox"/> translation of international application into (language): 7 <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8 <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9 <input checked="" type="checkbox"/> other (specify): GB FORM 23/77 REQUEST CERTIFIED COPY		
Figure of the drawings which should accompany the abstract: 1		Language of filing of the international application: ENGLISH		
Box No. IX SIGNATURE OF APPLICANT OR AGENT				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request) <input type="checkbox"/>				
 ROONEY, Paul, Blaise				

For receiving Office use only		2 <input type="checkbox"/> Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received:
1 <input type="checkbox"/> Date of actual receipt of the purported international application:		
3 <input type="checkbox"/> Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4 <input type="checkbox"/> Date of timely receipt of the required corrections under PCT Article 11(2):		
5 <input type="checkbox"/> International Searching Authority (if two or more are competent): ISA /		6 <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid <input type="checkbox"/>

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

2604
2601
(19) World Intellectual Property Organization
International Bureau



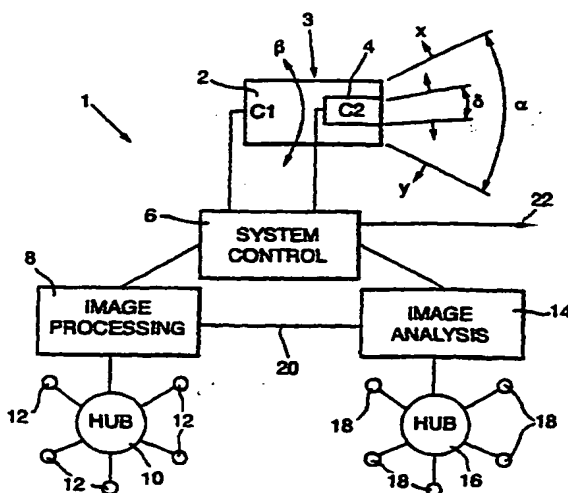
(43) International Publication Date
15 February 2001 (15.02.2001)

PCT

(10) International Publication Number
WO 01/11581 A1

- (51) International Patent Classification⁷: **G08B 15/02**,
H04N 7/18, 5/232, G08G 1/054
- (21) International Application Number: **PCT/GB00/02776**
- (22) International Filing Date: **19 July 2000 (19.07.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
9918248.7 4 August 1999 (04.08.1999) **GB**
- (71) Applicant (for all designated States except US): **MATRA
BAE DYNAMICS (UK) LIMITED [GB/GB]**; Six Hills
Way, Stevenage, Hertfordshire SG1 2DA (GB).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **TILSLEY, Gwilym,
John [GB/GB]**; Matra Bae Dynamics (UK) Limited, Six
Hills Way, Stevenage, Hertfordshire SG1 2DA (GB).
- (54) Title: **IMPROVEMENTS IN AND RELATING TO SURVEILLANCE SYSTEMS**
- (74) Agent: **BAE SYSTEMS PLC**; Group IP Department,
Farnborough Aerospace Centre, Lancaster House, P.O.
Box 87, Farnborough Hampshire GU14 6YU (GB).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: IMPROVEMENTS IN AND RELATING TO SURVEILLANCE SYSTEMS



(57) Abstract: A surveillance system which allows an operator to determine the type of objects or events which trigger image capture and analysis. Analysis of captured images is provided by access to various types of databases thereby providing for positive identification and monitoring of objects or events, and further provided for the system to issue control commands or prompt operations if required.

RECEIVED

MAR 13 2001

Technology Center 2600

WO 01/11581 A1

IMPROVEMENTS IN AND RELATING TO SURVEILLANCE SYSTEMS

This invention relates to the field of surveillance, and more specifically, but not exclusively to surveillance based systems which utilize intelligence of knowledge based systems to support their operation.

Improvements in the art of closed circuit image acquisition cameras have provided for a marked increase in the use of remote cameras for applications such as shop and public area security and more evidently traffic monitoring and law enforcement.

Typically, the type of camera systems utilised for shop and public area security fall into two main categories, namely the fixed field of view, fixed focus real time recorded video system, and the more labour intensive human operated system, usually comprising an operator directable and focusable camera assembly.

Law enforcement applications for camera systems typically comprise either a similar type operator based system as described above for traffic monitoring, or fixed position speed cameras, which utilize a radar based object speed detection sensor and timing unit to capture images against fixed references to allow for subsequent human analysis for the purpose of court evidence. Increasingly the use of digital camera technology is providing for more sophisticated vehicle speed analysis cameras, but typically such systems are mobile and require a human operator.

In an attempt to provide the police with greater information about the movement of vehicles around the UK road system, tracking systems have been proposed which utilize camera systems that effectively capture and analyse images of passing car registration plates. The information captured is relayed to a central unit, the information then being searchable so as to allow the selective identification of a known vehicle's movements.

One common problem encountered in the art is that of the amount of data which is required to be stored to enable meaningful post analysis of the

captured scene. Data compression techniques have been applied such as the storing of only every fourth video image frame, but this leads to the step animated appearance of some surveillance system image playback.

A further problem associated with surveillance systems is the quality of images and information discernible from such images that are captured and stored. The requirement to have a field of view camera or other imaging means sufficient to cover a whole scene usually dictates the use of low resolution, wide-angle equipment. Evidence of the poor quality images usually associated with surveillance systems can be illustrated by the footage produced from security systems such as those used in high street banks and petrol stations. Often the facial features of criminals are difficult to identify using the results of such systems, even when the criminal is captured facing directly at a camera.

Our invention provides for surveillance and monitoring system which comprises the ability to combine state of the image capture technology and real time scene and image analysis, with an intelligent, knowledge based system. This results in a surveillance system which requires minimum operator intervention to provide an intelligent assessment of captured real time events, and further provides for the ability to prompt an operator or initiate certain control functions on the witnessing of some pre-determined event or series of events.

Accordingly there is a surveillance system comprising imaging means, said imaging means being positioned so as to have a field of view of an area over which surveillance is required, image processing means, said image processing means being programmable such that an operator can pre-determine the events which activate use of image analysis means, image analysis means, said image analysis means utilising processing means to determine suitable control function responses to events viewed by said imaging means, and system control means, said system control means providing general control functions to said imaging means, scene processing means and scene analysis means.

In a preferred embodiment of said invention, said imaging means may comprise at least one first imaging means and at least one second imaging means, said second imaging means having the ability to provide more detailed information in relation to a partial section of the view of said first imaging means.

In another preferred embodiment of said invention, a plurality of said surveillance systems are so positioned in relation to an area which is to be subject to surveillance, such that the combination of the fields of view of said imaging systems provides for the ability to follow the progress of event moving or developing within the field of view of the plurality of said imaging means, thereby providing for a target tracking ability, allowing event analysis to be conducted over an increased time.

In a further embodiment of the invention said first and second imaging means are movable either in response to commands from a central system control means, or in response to operator issued commands.

In yet a further embodiment of the invention, said image analysis means comprises an artificial intelligence (AI) means, said AI means providing for increased selectivity in the choosing of target objects and patterns of events, thereby further reducing the level of data storage or compression required for operation of said surveillance system.

Embodiments of the invention will now be described by way of example only with reference to the following figures ;

Figure 1 is a schematic representation of a surveillance system in accordance with the invention.

Figure 2 is a diagrammatic representation of a scene captured by said first and said second cameras.

Figure 3 is a diagrammatic representation of a network of cameras in accordance with the invention.

Figure 1 shows a surveillance system 1 in accordance with the invention in which an imaging means 3 comprises two charged couple device (CCD)

- 4 -

cameras 2 & 4. Camera 2 comprises a wide to normal field of view low to normal resolution CCD camera, whereas in comparison to camera 2, camera 4 comprises a narrow field of view, higher resolution camera. Camera 4 may further comprise a zoom facility and may or may not be aligned to the boresight of camera 2. Cameras 2 and 4 may also be provided with dependent or independent controllable movement and rotation about a range of axis to further facilitate the possibility of acquiring an image for analysis.

Additionally cameras 2 and 4 may comprise, but are not limited to, discrete camera systems, multiple lenses or multiple mirror systems or adaptive optics systems, which may be co-located, widely spaced or be part of a multiple camera application.

The outputs of cameras 2 and 4 are fed to the image processing means 8 via a system control means 6. The image processing means 6 provides the first level of image analysis by processing the images captured by said camera 2 and determining whether further analysis of the image is required by reference to at least one database means 12. The image processing means will have been pre-programmed to be triggered into requesting further analysis of an image or images on witnessing certain pre-determined events, features or sequences of actions or images. The pre-determination of these events etc may require the use of and access to a range of data-base means, possibly via a hub means 10, including, but not limited to, human operators, Rule Based Systems (RBS), Knowledge Based Systems (KBS), Artificial Intelligence Systems (AI), Data-Bases, Algorithms and the like.

Examples of images or events which may form the basis of a pre-programmed trigger to request further analysis include the speed, dimensions, temperature, luminescence, time, frequency of passing, conformity or abnormality of human beings, animals, vehicles or other defined objects.

Additionally the image processing means may make a qualitative assessment of the image provided by camera 2, and should the threshold quality of the image not be provided by camera 2, then the image processing means will request from the system control means 6 that the second camera 4

- 5 -

be used so as to provide higher quality images for passing to the image analysis means 14. The assessment of the adequacy of the image to ensure sufficient characteristics have been captured will ensure the increase in certainty of recognition required for evidence purposes in criminal prosecutions.

Additionally the image analysis could be utilised to monitor patterns of behaviour of individuals or groups of individuals for the purposes of marketing and/or sales or customer/product intelligence.

The image analysis means 14 provides the surveillance system 1 with the ability to make a detailed analysis of the content of images supplied by cameras 2 and 4, such analysis being provided by access to a range of data-base means 18, in a similar fashion to that described above in connection with said image processing means. The image analysis means 14 is shown having a hub connection 16 to a range of data-base sources 18, which may include, but are not limited to human operators, RBS, KBS, AI, Data-bases and Algorithms and the like. The various database means available to the image analysis means may or may not include those database means accessible by the image processing means.

The image analysis means will have the ability to demand further image information, such information comprising higher or lower resolution images from cameras 2 and 4 or wider angle images along with use of additional imaging means such as, but not limited to, conventional radar, synthetic aperture radar (SAR), infra-red imaging systems (visible and non-visible), millimetric wave imaging systems, acoustic and magnetic systems.

Operator defined criteria will define the images which will be selected for image analysis 14. The nature and extent of the image analysis conducted will depend on the functionality of the particular surveillance system and it's constitute components. Examples of the extent of image analysis include the facial identification of human beings, with possible cross references to databases of known criminals, suspects or other persons whose whereabouts is required to be established, car registration analysis, with cross references to

details such as vehicle colour, speed, location, occupants, frequency of passing a known location, or time spent within a particular catchment area.

The image analysis function of the surveillance system is designed to include an element of 'self-learning' or AI which will provide for the establishment of pattern or behavioural analysis. Such analysis will provide for an effective filter mechanism to eliminate from further analysis activities or patterns of behaviour which it has been previously established are not worthy of further analysis, for example, the same car seen every Wednesday at 5:00pm, to 5:30pm, the same two men enter the building society carrying bags every Friday, a person of the same dimensions passes wearing a crash helmet every day.

The use of the image analysis means 14 combined with the other elements of the system will enable the identification of discrete features or known patterns of behaviour which differ from the established norm, or may warrant surveillance on the basis of matching with the identification of a particular person, object or combination thereof.

The system control means 6 provides the surveillance system 1 with control functions required to administer the operation of the system as a whole, and may include, but are not limited to self diagnostic functions (image quality, system functionality, communications integrity etc), alarm functions relating to unlawful interference with the system and control of the imaging means by functions such as managing requests from the image processing means to switch or alter characteristics or functions of the imaging means (i.e. direction, focus, lens, resolution, type of camera etc). Additionally the system control means may control and/or manage the communications links to the various external bodies, databases, establishments or persons required by the type of operation to which the system is being put to use.

Figure 2 shows an example of a scene as may be viewed by an imaging system 2 & 4 as described above. The extent of the viewable image is shown 24, the view comprising a section of highway 28 and an area of public walkway 40. A car 26 is shown passing through the scene 24, and in this example of a

- 7 -

surveillance system in accordance with the invention, a trigger has been pre-programmed within the image processing means 8 such that when a car passes through the scene 24, the image analysis means 14 is activated and certain information is sought for further analysis.

In the car 26 passing through the scene 24, the image analysis means would typically be programmed so as to try and acquire positive identification of the numerals displayed on the vehicle registration plate 32. Should the image supplied by the camera 2 not provide sufficient clarity or contain sufficient information for such data to be acquired, then the image processor means will request, via the system control means, that a higher resolution camera means 4 is used, giving more detailed information relating to one area of the scene 24. In this example, frame 30 shows a representative field of view for camera 4, the information contained therein being sufficient for the image analysis means 14 to make a positive identification of the vehicle registration plate. Once the image has been acquired, the image analysis means 14 can connect via the hub 16 to a database of known vehicle registrations, and if required can store or supply information relating to the said vehicle to another database or to any other type of display or data storage means. Additionally, other databases may be interrogated so as to provide further identification features such as the cross matching of the vehicle colour to that on the registration details, cross referencing the registration to vehicles reported stolen or the owners of which are required for questioning by the police or insurance companies, along with other possible checks such as vehicle speed, frequency of passing a certain location and elapsed time spent within a certain vicinity.

The system can further be utilised for example to acquire images of vehicle occupants. Frame 34 depicts the field of view of camera 4, giving a view of the occupant of the vehicle. The image can then be interrogated by reference to a facial identification database (i.e. 18), which again may be further interfaced to additional databases and/or RBS, KBS and AI systems to enable the identification and knowledge of the movements and type of transport used by specific persons or groups of persons.

Figure 2 also depicts a view taken from an imaging means 2 showing a group of people 44 walking along a pathway 40. One of the pre-determined triggers for the image processing means 8 could be the recognition of 'human shaped objects' 44. The image analysis means would then be tasked with identifying the face of the human being by applying the use of camera 4 and frame 46. In the event that the face of the human could not be identified due to obscuration by means such as a hat 42 or balaclava (not shown), the image analysis means would record a failure to identify a target and depending on the nature and extent of the rules governing the database means may either raise an alarm to an operator, or begin a further sequence of analysis to try and further identify characteristics of the subject. Such further analysis could extend to identifying objects 50 carried by the subject, and by applying the use of higher resolution camera means 4, using field of view frame 48, the image analysis means will attempt to identify the object 50 by reference to a list of known threats, i.e. firearms, truncheons, knives etc. Depending on the result of the analysis, images may be stored and/or operator alarms maybe activated or other control functions initiated such as alarms, door closures, lighting increased and the like.

Figure 3 shows a network of surveillance systems 52,54,56,58, in accordance with the invention. Each of said individual surveillance systems 52,54,56,58 can operate in accordance with the system described in figure 1, each having imaging means 2, 4, system control means 6, image processing means 8, image analysis means 14, hub means 10, 16 and database means 12, 18. Additionally there is provided a master system control means 62, master image processing means 64, master image analysis means 66, and corresponding hub means 68, 70 and database means 72, 74. The master elements of the system 62, 64, 66 as depicted in figure 3, enable the surveillance system as a whole to be centrally managed or controlled to enable more sophisticated surveillance tasks to be undertaken. A typical connectivity is illustrated between the elements of the networked system, but various combinations or interface means may be provided between said elements such

as databus technology, digital or analogue cable or terrestrial transmissions or satellite communications.

Utilising the invention in the embodiment shown at figure 3, if image analysis means 6 comprising a camera acquires an image which is passed by the image processing means 8 to the image analysis means 14, then should said image move out of view of the system 52, then via the master system control means 62, the imaging means of system 54 can be employed to continue the surveillance and analysis as required. This 'hand-over' between the individual elements of the networked system provides for a far greater area coverage than the individual system, and additionally provides for ensuring the continuity of surveillance required for evidence in criminal prosecutions.

Alternatively, in an embodiment not illustrated, the surveillance system may be provided with a system control means and/or a master system control means which is provided with a plurality of imaging means connected to directly to said master or system control means, thereby providing for the centralising of the control functions of the system, and the probable reduction in the number of image processing and image analysis means required to perform the surveillance operation.

The imaging means 3 provided for use with the system may be mobile, or connected or installed on a mobile platform or vehicle.

The system as a whole may itself be self contained such that references to databases should be interpreted as references to algorithms contained in or accessible by the system. Such self contained systems may make use of mobile or fixed cameras but be self contained in the sense of no communications to databases outside of the system.

CLAIMS

1. A surveillance system comprising imaging means, said imaging means being positioned so as to have a field of view of an area over which surveillance is required, image processing means, said image processing means being programmable such that an operator can pre-determine the events which activate use of image analysis means, image analysis means, said image analysis means utilising processing means to determine suitable control function responses to events viewed by said imaging means, and system control means, said system control means providing general control functions to said imaging means, scene processing means and scene analysis means.
2. A surveillance system as claimed in claim 1, wherein said imaging means comprising at least one first imaging means and at least one second imaging means, said second imaging means having the ability to provide more detailed information in relation to a partial section of the view of said first imaging means.
3. A surveillance system as claimed in claims 1 and 2 above, wherein a plurality of said surveillance systems are so positioned in relation to an area which is to be subject to surveillance, that the combination of the fields of view of said imaging systems provides for the ability to follow the progress of event moving or developing within the field of view of the plurality of said imaging means.
4. A surveillance system as claimed in claims 1, 2 and 3 above, wherein said first and second imaging means are movable either in response to commands from a central system control means, or in response to operator issued commands.
5. An imaging means for surveillance as claimed in claims 1, 2 and 3 above, wherein said image analysis means comprises an artificial intelligence (AI) means.
6. A surveillance system as hereinbefore described with reference to the accompanying drawings.

Fig.1.

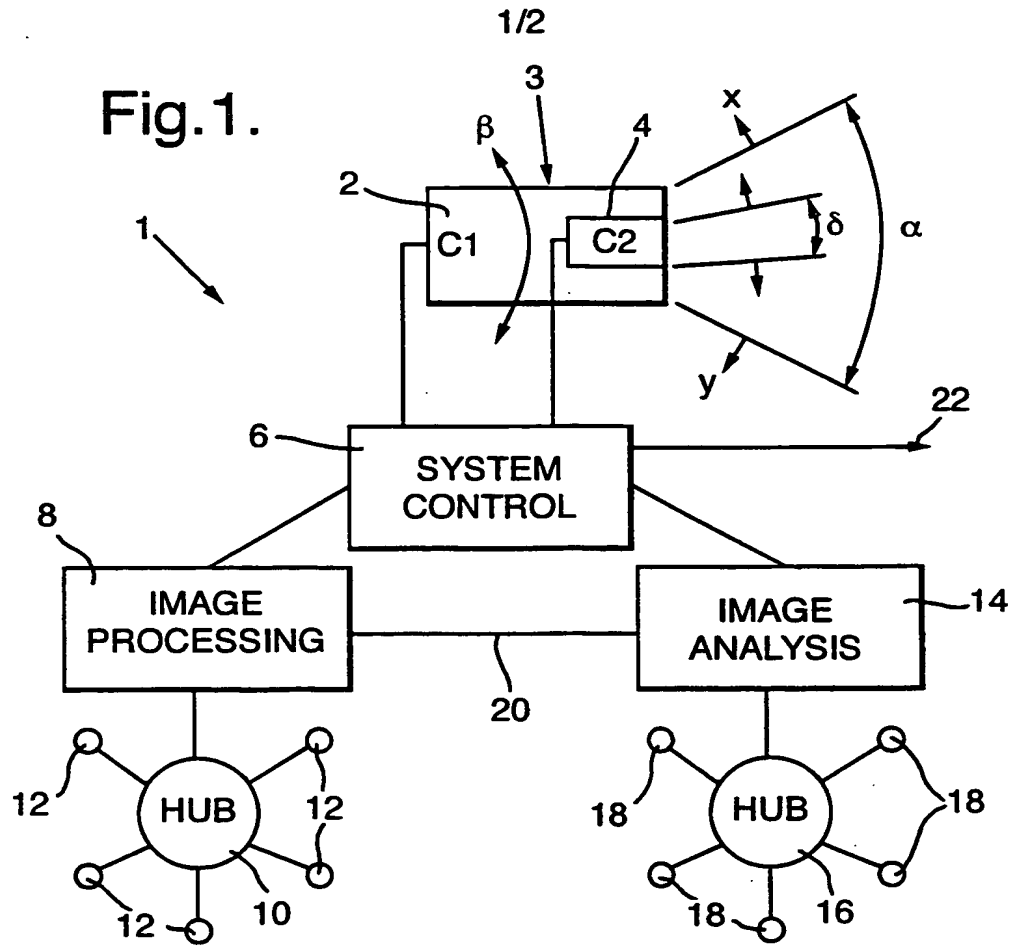
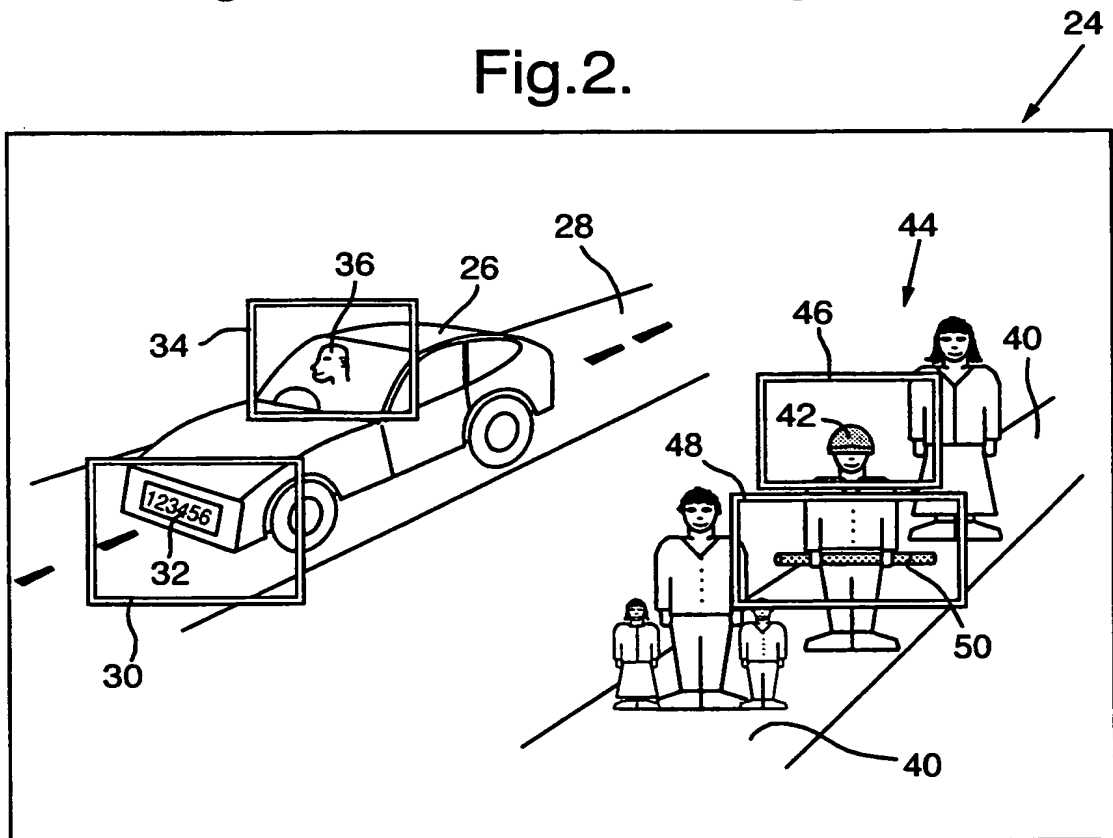
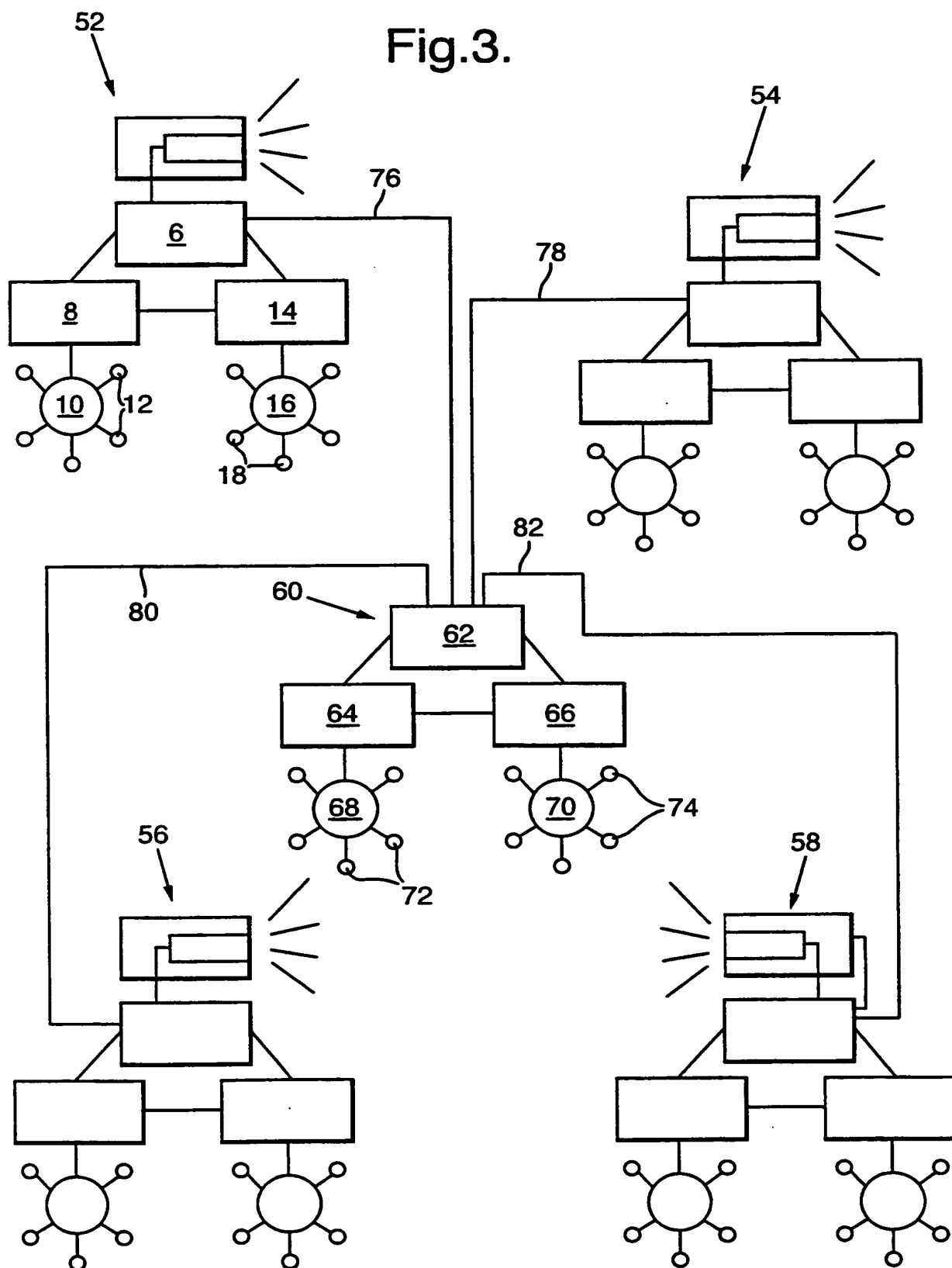


Fig.2.



2/2

Fig.3.



INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/GB 00/02776

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G08B15/02 H04N7/18 H04N5/232 G08G1/054

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G08B H04N G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 93 19441 A (COMMW SCIENT IND RES ORG ;TELSTRA CORP LTD (AU)) 30 September 1993 (1993-09-30) page 6, line 21 -page 10, line 7; figures 1-7	1-6
A	FR 2 704 818 A (SNCF) 10 November 1994 (1994-11-10) claims 1-6	1-6

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

30 October 2000

Date of mailing of the international search report

07/11/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Sgura, S

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/02776

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9319441 A	30-09-1993	AU 671106 B	15-08-1996
		AU 3740293 A	21-10-1993
		EP 0631683 A	04-01-1995
		JP 7505966 T	29-06-1995
		NZ 249799 A	26-11-1996
		NZ 299442 A	27-04-1998
		US 5809161 A	15-09-1998
FR 2704818 A	10-11-1994	CZ 9502374 A	17-01-1996
		DE 69413531 D	29-10-1998
		DE 69413531 T	18-03-1999
		EP 0695253 A	07-02-1996
		ES 2124886 T	16-02-1999
		WO 9425324 A	10-11-1994
		PL 312380 A	15-04-1996

PATENT COOPERATION TREATY

PCT

09622810

RECEIVED

JAN 04 2001

Technology Center 2600

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference XA1127	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 02776	International filing date (day/month/year) 19/07/2000	(Earliest) Priority Date (day/month/year) 04/08/1999
Applicant MATRA BAE DYNAMICS (UK) LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the title,

the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,

the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/02776

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G08B15/02 H04N7/18 H04N5/232 G08G1/054

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G08B H04N G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 93 19441 A (COMMW SCIENT IND RES ORG ;TELSTRA CORP LTD (AU)) 30 September 1993 (1993-09-30) page 6, line 21 -page 10, line 7; figures 1-7	1-6
A	FR 2 704 818 A (SNCF) 10 November 1994 (1994-11-10) claims 1-6	1-6

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

30 October 2000

Date of mailing of the international search report

07/11/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Sgura, S

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/02776

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9319441 A	30-09-1993	AU 671106 B	15-08-1996
		AU 3740293 A	21-10-1993
		EP 0631683 A	04-01-1995
		JP 7505966 T	29-06-1995
		NZ 249799 A	26-11-1996
		NZ 299442 A	27-04-1998
		US 5809161 A	15-09-1998
<hr/>			
FR 2704818 A	10-11-1994	CZ 9502374 A	17-01-1996
		DE 69413531 D	29-10-1998
		DE 69413531 T	18-03-1999
		EP 0695253 A	07-02-1996
		ES 2124886 T	16-02-1999
		WO 9425324 A	10-11-1994
		PL 312380 A	15-04-1996

09/622,810

PATENT COOPERATION TREATY

PCT

REC'D 31 OCT 2001

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference XA1127	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/02776	International filing date (day/month/year) 19/07/2000	Priority date (day/month/year) 04/08/1999
International Patent Classification (IPC) or national classification and IPC G08B15/02		RECEIVED APR 01 2002
Applicant MATRA BAE DYNAMICS (UK) LIMITED et al		Technology Center 2600

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 26/02/2001	Date of completion of this report 26.10.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Wagner, U Telephone No. +49 89 2399 8171 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02776

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-9 as originally filed

Claims, No.:

1-6 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02776

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 5,6.

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 5,6 are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Yes: Claims

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02776

	No:	Claims	1-3
Inventive step (IS)	Yes:	Claims	
	No:	Claims	4
Industrial applicability (IA)	Yes:	Claims	1-4
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

D1: WO 93 19441 A (COMM. SCIENT IND RES OR ;TELSTRA CORP LTD
(AU)) 30 September 1993 (1993-09-30)

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. Claim 5 claims that the image analysis means comprises an "artificial intelligence means". This term on its own is too broad and vague to clearly define the scope of protection included by such a claim. No meaningful statement about novelty and inventive step can be given for this claim. This could only be overcome by including in claim 5 a limitation to the said term.
2. Claim 6 includes a general reference to the drawings. Its scope of protection is therefore absolutely unclear (Art. 6 PCT). Therefore, no meaningful statement under Art. 33 PCT can be made for claim 6.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The surveillance system of D1 comprises imaging means (6,8), image processing means (page 6, line 30) being pre-programmed to discriminate certain events (moving objects), and image analysis means which can be realised in node 2 (page 7, top) or in a remote central site (figure 6). The image analysis means in D1, figure 6 use processing means in the form of an image database (49), a licence plate recognition system (51) or a user interface (53) to determine suitable control functions, like reporting a speed limit infringement. Although not explicitly mentioned, it is immediately evident to a skilled person that the system in D1, like any other system created by man, includes a system control means providing control functions.

Therefore, the features of claim 1 are anticipated by D1. Art. 33(1) PCT is not met.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/02776

2. The feature of claim 2 is disclosed by D1 in figure 1. Claim 2 lacks novelty, Art. 33(1) PCT.
3. The feature of claim 3 is disclosed by D1 in figure 7 and page 9, line 16 - page 10, line 7. Claim 3 therefore lacks novelty, Art. 33(1) PCT.
4. The feature of claim 4 is part of the normal design competence of a person skilled in surveillance systems. Its inclusion cannot justify the presence of an inventive step in claim 4. Art. 33(1) PCT is not met.

Re Item VII

Certain defects in the international application

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.
2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).